

## Work Plan

### Alternative Landfill Cover Design

#### Introduction

In an October 12, 2012 letter, EPA Region 7 asked that, as part of a Supplement to the Supplemental Feasibility Study [SFS] (EMSI, 2011), the Respondents evaluate potential alternative landfill cover designs including but not limited to an Evapo-Transpiration (ET) Cover for Operable Unit-1 (OU-1) of the West Lake Landfill. EPA had previously indicated that the National Remedy Review Board wanted the use of synthetic cover materials evaluated as part of the Supplemental SFS. During a September 24, 2013 meeting to discuss EPA and MDNR comments on the various additional SFS evaluation work plans, EPA indicated that an ET cover was not applicable to OU-1. Therefore, this work plan presents a scope of work for evaluation of the potential application of an alternative cover that would incorporate a synthetic material layer, specifically a geosynthetic clay liner (GCL), into the design of the landfill cover for OU-1. The alternative landfill cover evaluation is focused on possible use of a GCL because a GCL contains natural clay material sandwiched between geotextile fabric. Use of natural materials is preferred due to the overall longevity of natural materials as compared to man-made materials.

#### Background

##### ROD-Selected Remedy Landfill Cover

The remedy selected in EPA's Record of Decision (ROD) for OU-1 (the ROD-selected remedy) includes an enhanced Resource Conservation and Recovery Act (RCRA) Subtitle D (solid waste) cover system to be installed and maintained over Radiological Areas 1 and 2 (EPA, 2008). This cover system would at a minimum be designed to meet the design requirements for final cover systems at municipal solid waste landfills (MSWLF) and the Missouri closure and post-closure requirements for sanitary landfills, with additional enhancements consistent with standards for uranium mill tailings sites (i.e., armoring layer, protection against gamma radiation, and radon barrier). Specifically, the design of the landfill cover under the ROD-selected remedy is anticipated to consist of the following layers (from top to bottom):

- A one-foot thick layer of soil capable of sustaining vegetative growth;
- A two-foot thick infiltration layer of compacted USCS CL, CH, ML, MH, or SC soil-type with a coefficient of permeability of  $1 \times 10^{-5}$  cm/sec or less; and
- A two foot thick bio-intrusion/marker layer consisting of well-graded rock or concrete/asphaltic concrete rubble.

Such a cover system includes a low conductivity barrier layer, in this case the two foot thick infiltration layer described above, to minimize percolation of rainfall or snowmelt through the cover from entering the underlying waste materials.

#### Landfill Cover Incorporating a Geosynthetic Layer

There are several types of geosynthetic products that are often used in landfill containment design that could be considered for alternate landfill cover designs to the soil-only landfill cover prescribed in the ROD remedy. For example, geomembranes or GCLs are often used as low-permeability components, and geonets and geotextiles are often used as drainage layers. For this evaluation, the use of a GCL will be evaluated. A GCL is a synthetic product composed of a core layer of natural low-permeability bentonite clay sandwiched between geotextile fabric. With its low permeability, a GCL may have the potential to be used as a substitute for all or part of the infiltration layer, and still achieve the objective of minimizing percolation through the cover. Selection of a GCL as the representative process option for the evaluation of an alternative cover using synthetic materials was based on the reliance of GCL on the presence of bentonitic clay for achieving low permeability. Being a natural material, bentonite is expected to offer significant advantages over plastic-only based geomembranes in terms of longevity and durability.

#### **Approach**

The potential implementability of an alternative landfill cover design for Areas 1 and 2 will be evaluated in the same manner that the potential applicability of other technologies are evaluated in the SFS. Specifically, an initial technical implementability screening evaluation will be performed to assess the potential applicability of the alternative landfill cover design. If the initial screening indicates that the alternative landfill cover design is potentially applicable to OU-1, this technology would then be subjected to further evaluation of its potential effectiveness, implementability and cost. During this phase, the anticipated performance of the alternative landfill cover design would be compared to that of the cover specified in the ROD-selected remedy. If these evaluations indicate that the alternative landfill cover design could provide similar effectiveness at minimizing infiltration at comparable cost, then a recommendation for consideration of use of an alternative landfill cover design would be made.

#### Geosynthetic Clay Liner Cover Design

An initial technical screening will be performed to assess the potential implementability of an alternative landfill cover design that incorporates a GCL liner into the landfill cover design specified under the ROD-Selected Remedy (hereafter referred to as the "GCL-alternate cover"). Because use of GCLs in cover systems is a generally accepted technology for landfills, the primary focus of this evaluation will be the anticipated design life of a GCL layer relative to the longevity criteria that have previously been identified as potentially relevant and appropriate requirements under the Uranium Mill Tailings

Radiation Control Act regulations for the landfill cover. The initial implementability-screening evaluation will also consider site-specific factors that could affect the implementability of a GCL-alternate cover. Specifically, the potential effects of a GCL-alternate cover on the overall stability of the final landfill slopes will be evaluated. In addition, the need for inclusion of additional soil material to allow for installation and incorporation of a GCL in the landfill cover and the resultant approximate impacts on the extent and volume of waste material that would need to be regraded will be considered. Finally, other installation and maintenance issues that may arise will be addressed.

If the initial technology screening evaluation indicates that a GCL-alternate cover is considered potentially implementable, this technology will be subjected to evaluation of its potential effectiveness, implementability and cost. During this phase, the anticipated performance of a GCL-alternate cover would be qualitatively compared to that of the cover specified in the ROD-selected remedy. If these evaluations indicate that a GCL-alternate cover could provide similar effectiveness to the ROD-selected remedy at minimizing infiltration at comparable cost without significant adverse impacts, then a recommendation for consideration of incorporation of a GCL-alternate landfill cover instead of the cover specified in the ROD would be made.

#### **Deliverables**

1. Interim Deliverable – A brief memorandum will be prepared summarizing the results of the initial screening of the potential implementability of a GCL-alternate cover for OU-1. If a GCL alternate cover is considered potentially implementable, this memorandum would also include an evaluation of the potential effectiveness, implementability and cost of these covers. If the results of these evaluations indicate that a GCL-alternate cover could provide comparable performance at a comparable cost to that of the low permeability cover included in the ROD-selected remedy, a recommendation for development and evaluation of use of an alternative cover design consisting of a GCL-alternate cover as an alternative to the ROD-selected remedy cover system would also be included in this memorandum.
2. SFS revisions – Assuming that the evaluation of a GCL alternate cover technology only entails evaluation of the potential applicability of this technology and does not result in development of new/additional remedial alternatives, the following revisions to the SFS report are anticipated:
  - a Section 4 – Technology Screening to include evaluation of GCL cover technology implementability
    - i. Section 4.2 – Identify a GCL-alternate cover as an additional technology/process option to be evaluated in the SFS
    - ii. Section 4.3 – Include a description of a GCL-alternate cover technology
    - iii. Section 4.4 – either
      1. Identify a GCL-alternate cover technology as a technology that was screened out based on implementability factors, or

- 2. Evaluate the implementability of a GCL-alternate cover technology
- iv. Figure 24 – Add evaluation of the technical implementability of a GCL-alternate cover technology to this figure.
- v. Figure 27 – Add evaluation of the anticipated effectiveness, implementability and cost of a GCL-alternate cover technology.

In the event that the GCL-alternate cover technology is found to be potentially applicable based on the site and waste conditions, there may be a need to develop one or more additional remedial alternatives for detailed analysis in the Supplemental SFS report. Such an effort is not included with the scope of the evaluation of an alternative landfill cover design addressed by this Scope of Work.

### **Schedule**

It is anticipated that performance of an initial technology screening of the potential implementability of a GCL-alternate cover technology for OU-1 will take approximately four weeks from receipt of EPA approval of this Work Plan. Assuming that a GCL-alternate cover technology is potentially implementable for OU-1, the technical evaluation of the potential effectiveness, implementability, and cost of such alternative landfill cover design and preparation of a summary memorandum will take approximately another four weeks time.

Preparation of a Supplemental SFS report that includes the results of the evaluations of a GCL-alternate cover technology will be performed once EPA comments on the interim deliverable are received and in conjunction with revisions to the existing SFS report required to address the results of the various other additional tasks EPA has requested.

### **References Consulted**

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